

Lead and Other Heavy Metals in the Construction Industry

Construction workers can be exposed to lead and other heavy metals on the job, which can cause anemia, hypertension, infertility, miscarriages, and damage to the nervous system or kidneys, depending on the metal and the exposure level. Exposures come mainly from fumes and dusts, thus putting a wide range of workers at risk from nearby operations. But the dangers may be most acute for welders, painters, masons, and hazardous-waste or lead-abatement workers.

Some state governments have legal authority for surveillance of heavy-metal exposures. While 35 states maintain registries of blood-lead levels reported by laboratories, only 6 states are known to maintain registries for heavy-metal exposures.¹

The health effects of exposures to heavy metals can be serious. Cadmium, for instance, is found in paint pigments and encountered during painting and welding; exposures can result in kidney and lung damage. Chromium is found in portland cement, concrete, and stainless steel and is released as a result of such work as welding, torch cutting, grinding, and sand blasting; exposures can cause nasal septum perforation, contact and allergic dermatitis – and, in the hexavalent form, lung cancer.²

Manganese, found in some types of steel and encountered in welding, can damage the central nervous system.³ Mercury can be found in electrical apparatus and some paints. Acute exposure to high concentrations of mercury vapor can cause corrosive bronchitis, inflammation of the lungs, and nervous-system damage; long-term exposure to lower levels is tied to damage to the nervous system and kidneys.

For some metals, NIOSH has set recommended exposure levels, which are guidelines. OSHA has standards for beryllium, cadmium, chromium, lead, mercury, and other heavy metals. Since 1993, the lead standard has required a program of protections for construction workers on jobs where they might be exposed to lead (29 CFR 1926.62). Lead endangers abatement workers and can also poison workers repairing or demolishing – welding, burning, and sandblasting – old bridges and other structures coated with lead paint. Although lead has been banned from residential paints since 1978, it is used in industrial paints and can be found in layers of paint in older housing and bridges and other steel structures.

The lead standard specifies medical monitoring (including a baseline blood-lead test) and the removal of workers having blood-lead levels at or above 50 micrograms per deciliter ($\mu\text{g}/\text{dL}$) from work where they can be exposed to lead until blood-lead levels are at or below 40 $\mu\text{g}/\text{dL}$. Many experts believe even 40 micrograms is too high.⁴

All but two states that maintain lead registries require reports at 25 $\mu\text{g}/\text{dL}$ or lower. (The 24 states in the CDC's Adult Blood Lead Epidemiology and Surveillance, or ABLES, program in 2000 reported 2001 adults – including an unspecified number of construction workers – had blood-lead levels of at least 40 $\mu\text{g}/\text{dL}$.)

The hazards of lead may reach workers' families, as well. One study concluded that 2 to 3% of U.S. children with blood-lead levels of 10 $\mu\text{g}/\text{dL}$ or greater were exposed to lead taken home from the workplace.⁵ Levels as low as 10 $\mu\text{g}/\text{dL}$ in children aged 1 to 5 years have been associated with harm to cognitive development, growth, and behavior.⁶

In the California lead registry, painting (SIC 1721) and masonry (SIC 1741) had the highest number of construction workers showing blood-lead levels of 25 $\mu\text{g}/\text{dL}$ or higher in 1995-2000 (chart 45a). Painters, who accounted for 42% of construction reports during the six years, were mainly industrial painters removing lead paint on bridges undergoing earthquake retrofit, although some of the painters were employed by residential or commercial painting contractors. An additional 16% of the construction workers in the registry did masonry work replacing lead-contaminated furnace material in lead smelters. (In 1997, according to the Census Bureau, painters were about 4% of 569,061 wage-and-salary construction employees in the state and masons were less than 2%, but this number excludes self-employed construction workers. No information is available on the extent of estimated exposures.)

Reports for individual years in California do not show a consistent trend by industry in construction, but appear to be influenced by the scheduling of large jobs (such as, bridge projects in 1995, 1999, and 2000 and smelter furnace masonry work in 1995, 1996, and 1998).

The numbers of construction workers and employers in the registry are small. For 1995-2000, only 233 painters from 47 companies were reported with blood-lead levels at or above 25 $\mu\text{g}/\text{dL}$. By comparison, U.S. Census data indicate 24,562 workers were employed by 4,394 painting establishments in California in 1997. A 1998 survey by the state identified 596 companies doing wrecking and demolition work; yet only seven such companies (1%) had employee blood-lead levels reported to the state that year. The low numbers might be explained by poor compliance with testing requirements among industries working with lead.⁷

In 1986-2001, New Jersey's registry listed 1,466 construction workers (from 269 workplaces) as having blood-lead levels at or above 25 $\mu\text{g}/\text{dL}$. Construction workers were 23% of the workers in the registry in 2001. The number of cases showing blood-lead levels at or greater than 40 $\mu\text{g}/\text{dL}$ among construction workers peaked at 103 in 1993 and ranged from 51 to 13 cases between 1986 and 2001.

Several factors may have contributed to the decline in reported lead levels of construction workers in New Jersey: the inclusion of lead safety in contract language for bridge construction by the state Department of Transportation in 1992, implementation of the OSHA interim lead-in-construction standard in 1993, a licensing requirement for lead abatement workers, and certification of lead abatement contractors by the state Department of Community Affairs, starting in 1996.

1. The six states that have reporting requirements for exposures to heavy metals other than lead and which code by occupation or industry, are Maine, Maryland, Massachusetts, New Jersey, New York and North Carolina (ABLES Listserv, May 2002). The 35 states with lead registries and the levels of micrograms per deciliter of lead at which reporting is required are Alabama (10 $\mu\text{g}/\text{dL}$), Arizona (10), California (25), Connecticut (all), Florida (10), Georgia (unk), Hawaii (unspec), Illinois (25), Iowa (all), Kansas (25), Kentucky (25), Maine (25), Maryland (25), Massachusetts (15), Michigan (all), Minnesota (all), Missouri (25), Montana (unk), Nebraska (all), New Hampshire (25), New Jersey (all), New Mexico (all), New York (all), North Carolina (40), Ohio (all), Oklahoma (10), Oregon (25), Pennsylvania (25), Rhode Island (all), South Carolina (40), Texas (25), Utah (15), Washington (all), Wisconsin (10), Wyoming (all).

2. William N. Rom, *Environmental and Occupational Medicine*, Second Edition, Boston: Little, Brown and Company, 1992, pg. 800; Barry S. Levy and David H. Wegman, eds., *Occupational Health Recognizing and Preventing Work-Related Disease, Fourth Edition*. Boston: Little Brown and Company, 2000, pp. 316 and 486.

3. G.J. Hathaway, N.H. Proctor, J.P. Hughes, *Chemical Hazards of the Workplace. Fourth Edition*. Van Nostrand Reinhold, 1996. A workers' compensation decision has linked manganese exposure to Parkinson's disease. See State of California, Division of Workers' Compensation, Case ANA 016 8718, May 1996, Jimmy Sartain vs. Washington Ornamental Ironworks/Beaver Insurance; Star "D" Ironworks/Great American Insurance.

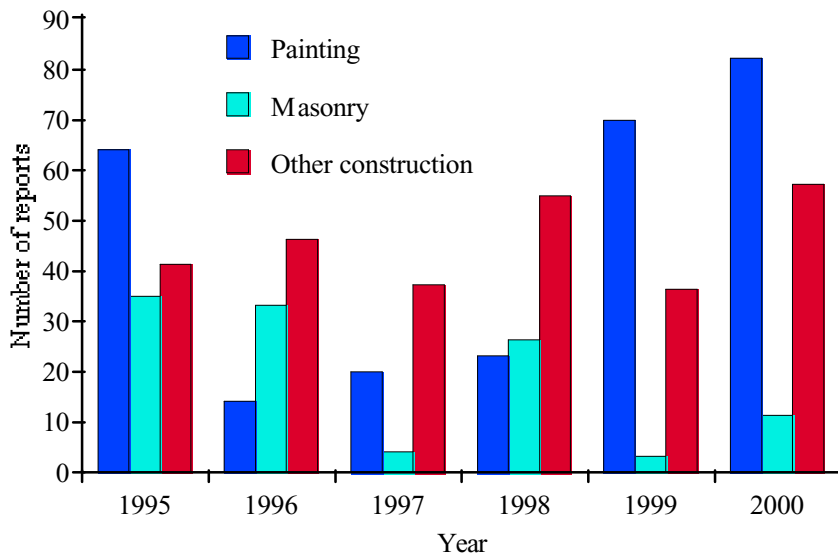
4. See Centers for Disease Control and Prevention, Blood Lead Levels in Young Children—United States and Selected States, 1996-1999, *Morbidity and Mortality Weekly Report*, 49(50): 1133-37, December 2000; E.K. Vig and H. Hu, Lead Toxicity in Older Adults. *Journal of the American Geriatrics Society*, 48(11):1501-1506, November 2000.

5. Robert J. Roscoe, Janie L. Gittleman, James A. Deddens, M.R. Peterson, and William E. Halperin, Blood Lead Levels among the Children of Lead-Exposed Workers: A Meta-Analysis. *American Journal of Industrial Medicine*, 36: 475-81, 1999.

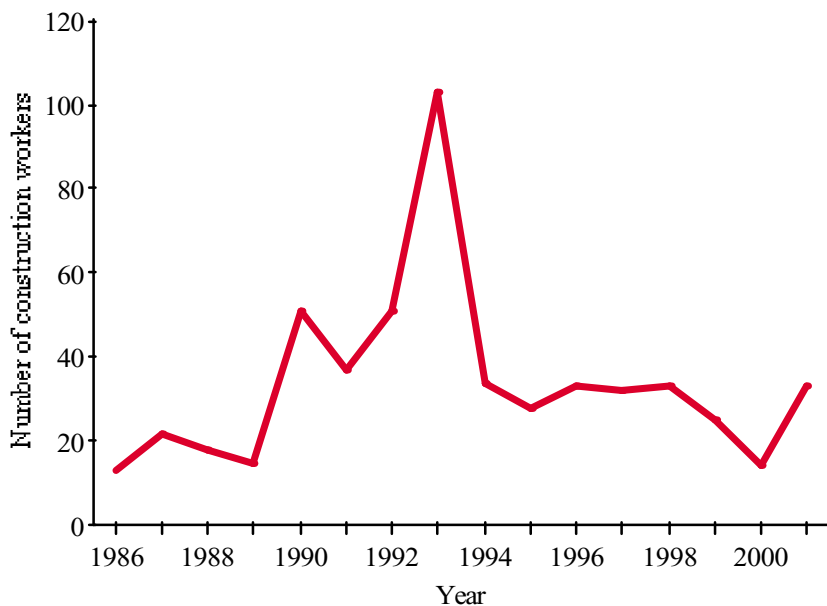
6. National Research Council. *Measuring lead exposure in infants, children, and other sensitive populations*. Washington, D.C.: National Academy Press, 1993

7. See L. Rudolph, D.S. Sharp, S. Samuels, C. Perkins, and J. Rosenberg. Environmental and biological monitoring for lead exposure in California workplaces. *American Journal of Public Health* 80(8): 921-25, 1990.

45a. Number of reports of worker blood-lead levels at or above 25 µg/dL in painting, masonry, and other construction industries, California, 1995-2000



45b. Number of construction workers reported in New Jersey as having blood-lead levels at or above 40 µg/dL, 1986-2001



Note: Chart 45a - The CDC's ABLES program defines elevated blood-lead levels as 25 micrograms per deciliter (µg/dL) or greater, the level at which California requires reporting. There were reports for a total of 559 construction workers in the 6-year period (some workers were reported more than once).

Chart 45b - Workers in SIC 15, 16, or 17. Total of 542 workers reported as having blood-lead level above 40 µg/dL; smallest number in a given year was 13 in 1986.

Source: Chart 45a - California Department of Health Services, Occupational Lead Poisoning Prevention Program.

Chart 45b - The New Jersey Department of Health and Senior Services, Adult Blood Lead Epidemiology and Surveillance Program.